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# Factors controlling surface ozone in the Seoul Metropolitan Area during the KORUS-AQ campaign


## Abstract

Urbanization and industrialization in metropolitan areas of South and East Asia have increased $O_3$ precursor emissions, leading to heightened concerns about air quality. The Korea-United States Air Quality (KORUS-AQ) campaign conducted extensive measurements to investigate air quality dynamics in the Seoul Metropolitan Area (SMA). During the experiment, there were 14 days with high concentration of $O_3$ episodes exceeding the 90 ppbv hourly maximum. A cluster analysis is performed and the data are classified into four groups of different periods based on the backward trajectory: C1 (stagnant), C2 (blocking), C3 (transport north), and C4 (transport south).

During stagnation periods (C1), local emissions led to an increase in $NO_x$ and VOCs. In the mornings, when UV levels were high, VOC oxidation resulted in a peak of HCHO. Additionally, occasional increases in $O_3$ during nights were associated with mesoscale circulation. Similarly, under blocking conditions (C2), higher levels of HCHO and $NO_z$ indicated aged air. During transportation periods (C3 and C4), $O_3$ levels increased along with $PM_{2.5}$. This period was characterized by high concentrations of CO and $SO_2$, but low levels of $NO_x$ and VOCs.

The authors further examine a series of indicators (such as: TVOC/$NO_x$, $O_3$/$NO_y$, HCHO/$NO_y$, etc.) and perform a model simulation with the framework for 0-D atmospheric modeling (F0AM). Their results show that the reduction of $O_3$ is proportional to the reduction of VOCs rather than $NO_x$. Overall, this study utilizing state-of-art air quality measurements provides a comprehensive understanding of O3 formation which can help improve air quality in the SMA.



## Keyword

Tropospheric ozone ($O_3$)
Ozone formation sensitivity


## References


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